P.E.I. WOOD FUEL SURVEY
1988-89

Prepared by

Stewart H. Bennie
Resource Ventures Incorporated
Charlottetown, Prince Edward Island

Survey Coordination

Robert LeClair

Submitted to

P.E.I. Department of Energy and Forestry
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Charlottetown, Prince Edward Island

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ABSTRACT

In February of 1990 a survey of 435 randomly selected households was conducted in the province. This represented a 1% sample of the provinces estimated 43,500 households. The survey indicated that 42.1% of the households in P.E.I. burned wood for heating purposes which is down from 55.2% of households in the 1986-87 survey.

The wood burning households consumed an average of 4.90 cords of wood during the 1988-89 heating season, down from the 5.57 cords in 1986-87. The combined effect of reduced numbers of wood fuel users and their lower rate of consumption resulted in a reduction of 40,000 cords of fuel wood from an all time high of 129,000 cords in 1986-87 to 89,000 cords in 1988-89.

Household wood buyers in the survey sample increased slightly from 23.7% to 24.4% of respondents while average consumption fell from 4.56 cords to 3.92 cords. Wood cutters average consumption fell slightly from 6.21 cords to 6.00 cords while the percentage of respondents fell from 37.8% to 21.6%.

SUMMARY OF FINDINGS

1. Since the beginning of the last decade approximately sixty percent of household respondents reported burning wood. As a result of the ownership sampling bias this was adjusted downward to 55%. The results of this survey determined that 45.9% of respondents burned wood. Making adjustment for the ownership sampling bias the percentage of estimated household wood burners was reduced to 42%.
2. Household wood fuel buyers in the sample increased by less than 1% of the respondents since the last survey in 1986-87 while their average wood fuel consumption rate dropped 14% from 4.56 cords in 1986-87 to 3.92 cords in 1988-89.
3. Household wood cutters in the sample decreased from 37.8% of respondents in 1986-87 to 21.6% in this survey. Their average rate of consumption changed only marginally from 6.21 cords to 6.00 cords.
4. The percentage of rural wood burners dropped from 74.5% of respondents in the 1986-87 survey to 62.2% in this survey, while the percentage of urban respondents burning wood remained almost constant at 29%.
5. The provincial household wood fuel market was estimated to be 129,000 ± 16,000 cords in 1986-87. This survey indicates that this has declined by about 31% to 89,000 ± 12,700 in 1988-89.
6. Light fuel oil and stove oil sales during the corresponding periods tend to confirm this decline.
7. Respondents attitudes towards wood burning may provide some indication to future activity. In the 1986-87 survey 51.7% of the respondents felt that the major advantage in burning wood was economic. In the 1990 survey only 32.5% of respondents felt that way. Wood cutters appear increasingly concerned about the amount of labour required in their activities while wood buyers have become more concerned about the "mess" involved in wood burning.
8. Pre-World War II dwellings make up 36% of the wood burning households and burned an average of 5.75 cords in 1988-89 while houses built in 1945-69 averaged 4.24 cords and those built since 1970 averaged 4.49 cords.
9. Multi-storey detached dwellings make up 60% of the wood burning households and burned in 1988-89 an average of 5.26 cords, almost one cord more than single storey detached homes.

10. More wood cutters and buyers are acquiring fuel earlier in the year, i.e. less fuel acquired in October-December, more in April-September.
11. Non-users of wood fuel and their connection to wood burning has not changed appreciably since the last survey. Three-quarters of the respondents report that they have never burned wood and a similar number report that they have no intention of burning it in the future. This questionnaire did determine that three-quarters of those who stopped burning wood did so within the last five years.
12. The average price paid for a cord of wood for the 1989-90 heating season was $81.00. This was $5.00 or 6.5% higher than paid in the 1986-87 heating season.

It would appear that rising wood fuel prices, stable fuel oil prices and better rural incomes have led to a decline in wood fuel consumption. Higher fuel oil prices and/or an economic down turn (e.g. poor fishing incomes) could result in higher wood fuel consumption while stability could lead to further declines in wood fuel consumption.

1. INTRODUCTION

1.1 Sampling

A sample of 435 respondents was drawn from the May 1989 edition of Island Telephone's directory. This represents a 1% sample of P.E.I.'s estimated 43,500 households[1].

The sample was drawn using a computer generated series of five digit random numbers. The first three digits determined the column and the second two digits determined the position within the column. The respondents identified by this method were called during the last two weeks of February by experienced telephone interviewers. Each interviewer was supplied with additional numbers because not all of the drawn numbers could be contacted. Interviewers were expected to try each number three times before choosing a replacement number. After examination of the completed questionnaires four were discarded leaving a sample of 431 (sample size 0.99% of estimated households).

1.2 The Questionnaire

The 1986-87 survey questionnaire was used as a starting point for the development of the 1990 questionnaire. The last questionnaire contained 37 questions while the 1990 contains 45. The 1986-87 survey attempted to determine if the recent reduction in fuel oil prices would have an effect on wood burning. Most respondents did not recognize that a change had taken place and as such did not anticipate making changes in their wood burning activities. Repeating this question did not appear to make sense since the reduction took place four years ago and oil prices have remained relatively constant since that time.

Questions on the following topics were added, a few of which were added for sampling validation purposes:

- housing type;
- housing age;
- sex of respondent;
- number of persons in household;
- education level of respondent; and
- family income.

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[1]Estimate from P.E.I. Housing Corporation.

NOTE: This survey was carried out in February 1990 in the middle of the 1989-90 heating season. With the exception of one question relating to the number of cords of wood consumed during the 1988-89 heating season and a question about wood prices in 1988-89 the responses to the questionnaire should be related to the 1989-90 heating season.

1.3 Survey Bias

The potential for bias in any survey is always a possibility. In the first wood survey (1979-80) a bias toward owner occupied homes was consciously built into the administration of the questionnaire, i.e. householders who rented their dwellings were specifically excluded from the questionnaire. The next four surveys (1980-81, 1982-83, 1984-85, 1986-87) included all households provided that they had telephone service and that their number was listed in the directory.

This survey followed the same procedures as carried out in the previous four surveys. Householders were asked whether they owned or rented their homes, which county they lived in and whether they lived in an urban or rural area. In this questionnaire, unlike the previous questionnaires, the respondents were asked whether they lived in specific communities (see question 3, Appendix C) to determine whether they were urban or rural dwellers.

The results from these questions and a comparison with 1986 Census data follows:

TABLE 1

% Rental Versus Owner Occupied Dwelling

	#	%	1986 Census %
Own	366	84.9	74.3
Rent	65	15.1	25.7
Total	431	100.0	100.0

TABLE 2

Household County Distribution

	Prince	Queen	Kings	Total
1990 Survey #	101	227	103	431
1990 Survey %	23.4	52.7	23.9	100.0
1986 Census %	33.5	51.6	14.9	100.0

TABLE 3

Urban/Rural/County Distribution of Households

		1990 Survey #	1990 Survey %	1986 Census* %
Prince	Urban	52	51.5	32.7
	Rural	49	48.5	67.3
	Total	101	100.0	100.0
Queens	Urban	157	69.2	54.7
	Rural	70	30.8	45.3
	Total	227	100.0	100.0
Kings	Urban	0	0.0	0.0
	Rural	103	100.0	100.0
	Total	103	100.0	100.0

*1986 Census as defined in Question 3 of the Survey Questionnaire, Appendix C.

The smaller than expected number of respondents who rent has been felt to be the result of a high proportion of singles and single parent families in rental dwellings who may be difficult to contact.

The greater proportion of urban dwellers in Prince and Queens Counties and the larger proportion of respondents in Kings County and fewer in Prince may be due to some fault in either the sampling process or in the way that non-residential listings in the telephone book may have influenced the sampling process.

Because this analysis was not done in previous years it is not possible to say if this occurred in prior surveys.

1.4 Significance of the Results

In reviewing the results care must be exercised in their interpretation because of the following:

(a) the information was obtained in a 10-20 minute telephone interview with one of the heads of the household;

(b) in some cases the respondents ability to answer the questions accurately is uncertain, i.e. 40% of the respondents, whose households buy wood, could not define the dimensions of a cord of wood;

(c) as previously noted the questionnaire was carried out in February 1990. The wood fuel question was specific to the 1988-89 heating season while prices related to the 1989-90 heating season with a non-quantitative question related to the price in 1988-89; and

(d) apart from clearly factual questions, e.g. What county do you live in? the answers should be interpreted as being representative of the time when the questions were asked.

In general the results of a survey such as this are best compared with results from previous surveys rather than viewing the results as absolute.

Where possible we have attempted to statistically analyze results. Fuel consumed by wood burners in 1988-89 was analyzed.

The answers were grouped and statistically analyzed. The mean decreased from 5.6 cords to 4.9 cords between 1984-85 and 1986-87. The standard deviation increased slightly over the same period from 2.34 to 2.46. Statistical analysis will show that we can be 95% confident that the 1988-89 average is less than 1986-87.

In the body of the report further analysis of these figures will be discussed.

2. PROFILE OF RESPONDENTS

2.1 Sample Profile

Tables 1-8 record the characteristics of the 431 respondents interviewed. These characteristics are related to the basic breakdown of wood fuel users (cutters and buyers) and non-users.

TABLE 4

Home Ownership of Wood Fuel Users and Non-Users

	Homeowners	Home Renters	Total
Non Users	178 (76.4%)	55 (23.6%)	233 (100.0%)
Cutters	88	5	93
Buyers	100	5	105
Total Wood Fuel Users	188 (94.9%)	10 (5.1%)	198 (100.0%)
Total Households	366 (84.9%)	65 (15.1%)	431 (100.0%)

(1986-87 survey results in brackets.)

Households which rent make up only 5% of the wood fuel users and 24% of the households which do not burn wood. In the overall sample only 15% stated that their dwellings were rented. This is well short of the reported 26% of dwellings that are rental (adjusted 1986 Census figures). The difference is less than recorded in previous studies (1986-87 - 10% rental).

TABLE 5

Urban and Rural Wood Fuel Users and Non-Users

	Rural		Urban		Total	
	#	%	#	%	#	%
Wood Cutters	69	31.1 (49.0)	24	11.5 (9.4)	93	21.6 (37.8)
Wood Buyers	69	31.1 (25.5)	36	17.2 (19.0)	105	24.4 (23.7)
Non-Wood Users	84	37.8 (25.5)	149	71.3 (71.6)	233	54.0 (38.5)
Total	222	100.0 (100.0)	209	100.0 (100.0)	431	100.0 (100.0)

(1986-87 survey results in brackets.)

While previous surveys asked respondents whether they lived in an urban or rural area this questionnaire defined urban as the Summerside and Charlottetown areas (see Questionnaire, question 3.) The urban percentage breakdown between cutters, buyers and non-users is similar to the 1986-87 survey, however the rural figures show a significant drop in wood cutters, a rise in wood buyers, and a

significant increase in households not burning wood. In the overall picture wood buyers have remained relatively constant while wood cutters have declined sharply with non-wood users increasing correspondingly.

TABLE 6

County Distribution of Wood Fuel Users and Non-Users

	Prince (N=101)		Queens (N=227)		Kings (N=103)		Total (N=431)	
	#	%	#	%	#	%	#	%
Wood Cutters	19	18.8 (46.8)	42	18.5 (27.1)	32	31.1 (48.1)	93	21.6 (37.8)
Wood Buyers	22	21.8 (19.9)	55	24.2 (28.6)	28	27.2 (18.2)	105	24.3 (23.7)
Non-Wood Users	60	59.4 (33.3)	130	57.3 (44.3)	43	41.7 (33.7)	233	54.1 (38.5)
Total	101	100.0 (100.0)	227	100.0 (100.0)	103	100.0 (100.0)	431	100.0 (100.0)

(1986-87 survey results in brackets.)

The county breakdown of wood cutters, buyers and non-users shows that the percentage of wood cutters has declined right across the province with corresponding increases in households not burning wood. The only other development is the increase in wood buyers in Kings County.

TABLE 7

Household Size of Wood Fuel Users and Non-Users

	Users (N=198)		Non-Users (N=233)		Total (N=431)	
	#	%	#	%	#	%
One and Two	68	34.4	121	51.9	189	43.8
Three	40	20.2	45	19.3	85	19.7
Four	51	25.7	37	15.9	88	20.4
Five or More	39	19.7	30	12.9	69	16.1
Total	198	100.0	233	100.0	431	100.0

Non-users of wood have a larger percentage of respondents with households consisting of one or two persons.

TABLE 8

Housing Types of Wood Fuel Users and Non-Users

	Users (N=198)		Non-Users (N=233)		Total (N=431)	
	#	%	#	%	#	%
Single Storey Detached	72	36.4	89	38.2	161	37.4
Multi-Storey Detached	118	59.6	69	29.6	187	43.4
Other (Multi-Unit Buildings & Mobile Homes)	8	4.0	75	32.2	83	19.2
Total	198	100.0	233	100.0	431	100.0

Single storey detached dwellings show little variation between the two categories of wood fuel users and the non-users. The multi-storey detached category (i.e. more than one storey) are found twice as frequently in the wood users categories than in the non-users. This difference may be the result of these buildings being larger, older and more difficult to heat. The other category made up of multiple units are most likely rental units, many of which are centrally heated.

TABLE 9

Dwelling Year of Construction vs. Wood Fuel Users and Non-Users

	Users (N=198)		Non-Users (N=233)		Total (N=431)	
	#	%	#	%	#	%
Constructed 1970-1989	90	45.5	127	54.5	217	50.3
Constructed 1945-1969	35	17.6	47	20.2	82	19.0
Pre-1944	72	36.4	49	21.0	121	28.1
Don't Know	1	0.5	10	4.3	11	2.6
Total	198	100.0	233	100.0	431	100.0

Wood fuel users housing stock is somewhat older than non-users. Pre-World War II housing stock is of particular interest.

3. WOOD FUEL USERS

3.1 Characteristics of Wood Fuel Users

As noted in the previous section the frequency of respondents claiming they burn wood has declined from 61.5% to 45.9% with wood cutters dropping from 37.8% to 21.6% of the 431 respondents. It is against this background that we should look at the following characteristics of wood fuel users.

TABLE 10

Primary Wood Burning Appliances of Wood Fuel Users

	1990 Survey %	1986-87 Survey %
Airtight Wood Stove	43.6	42.1
Wood Furnace/Boiler	24.4	26.6
Kitchen Wood Range	5.6	10.3
*Kemac	8.6	6.7
Combination (wood/oil) Furnace/Boiler	8.6	9.5
Non-Airtight Wood Stove	7.1	2.0
Open Fireplace	0.5	0.4
Fireplace Insert	1.5	2.4
Total	100.0	100.0

*Kemac is the trade name for a common oil assist unit attached to the back of a wood burning kitchen range. The Kemac and other similar units, such as the Boston Breeze, were commonly used through the 1950's, 60's and 70's in Prince Edward Island. Initially such units were used to assist in the burning of wood, but as oil became more common and cheap, many households stopped using wood and relied entirely upon oil.

Airtight wood stoves and wood fired warm air or boiler furnaces continue to make up two-thirds of the appliances used by wood burners.

TABLE 11

Other Heating Systems of Wood Users

	1990 (N=198) %	1986-87 (N=252) %
Wood Unit(s) Only	15.2	17.9
Hot Air Oil Furnace	30.8	34.9
Hot Water Oil Furnace	35.9	26.2
Combination Wood/Oil Air/Water	8.1	11.9
Oil Space Heater	2.5	2.4
Kerosene Heater	0.5	0.4
Kemac	2.0	4.8
Electric Heat	3.5	1.2
Other	1.5	0.4
Total	100.0	100.0

As noted in the 1986-87 report wood only units continue to be more than twice as common with wood cutters as they are with wood buyers.

Among wood users 23.7% heated all or some of their domestic hot water by burning wood. This is down somewhat from the last survey at 29.0%.

TABLE 12

Duration of Wood Heat Use

	1990 (N=198) %	1986-87 (N=252) %
0-2 years	15.2	17.9
2-4 years	30.8	34.9
4-6 years	35.9	26.2
6 or more years	65.7	48.8
Total	100.0	100.0

In 1986-87 it was reported that over 50% of the wood burning respondents who cut wood had been burning wood for six or more years. In this survey over 74% of the wood cutters have burnt wood for this period of time.

TABLE 13

Wood Types Used in Space Heating

	Cutters (N=93) %	Buyers (N=105) %	Wood Fuel Users (N=198) %
Softwood Only	2.2	1.9	2.0
Hardwood Only	23.7	60.0	42.9
75% Hard 25% Soft	35.5	20.0	27.3
50% Hard 50% Soft	25.8	14.3	19.7
25% Hard 75% Soft	11.8	1.9	6.6
Don't Know	1.1	1.9	1.5
Total	100.0	100.0	100.0

Wood buyers continue to be more particular about the type of wood they burn, while wood cutters have become somewhat less selective. The weighted average of all wood burners works out to 76% hardwood, 24% softwood.

Seasoned wood was reported being burned by 83% of the respondents with a mixture of seasoned and green reported by 14%. The corresponding percentages in the last survey were 70% and 26%. This change is primarily due to the decline in wood cutters and in the relative importance of wood buyers.

3.2 Wood Fuel Consumption

For the 1988-89 heating season respondents reported the following wood fuel consumption.

TABLE 14

Wood Fuel Consumption for Wood Burning Households
1988-1989 Heating Season

Cords Burned	Cutters		Buyers		Total	
	Household	%	Household	%	Household	%
0 - 1	2	2.2	7	6.7	9	4.5
1 - 2	0	0.0	17	16.2	17	8.6
2 - 3	9	9.7	12	11.4	21	10.6
3 - 4	6	6.5	18	17.1	24	12.1
4 - 5	14	15.1	15	14.3	29	14.6
5 - 6	14	15.1	12	11.4	26	13.1
6 - 7	6	6.5	6	5.7	12	6.1
7 - 8	10	10.8	4	3.8	14	7.1
More Than 8	27	29.0	7	6.7	34	17.2
Don't Know	5	5.4	7	6.7	12	6.1
Total	93	100.0	105	100.0	198	100.0

From the above table weighted average consumption was calculated and compared with results obtained from the 1986-87 survey.

TABLE 15

Weighted Average Consumption (cords/heating season)

	Cutters	Buyers	Wood Burners
1988-89	6.00	3.92	4.90
1986-87	6.21	4.56	5.57

It is impossible to determine the accuracy of respondents estimates of wood fuel consumption. The 3.5% reduction in cutters consumption is probably insignificant while the 14% reduction in wood buyers consumption is significant.

The following five tables break down the wood fuel consumption of various classes of wood burners.

TABLE 16

1988-89 Household Wood Fuel Consumption Urban and Rural

	Urban	Rural	Total
Cords/Season	3.61	5.48	4.90

TABLE 17

1988-89 Household Wood Fuel Consumption by County

	Prince	Queens	Kings
Cords/Season	5.01	4.37	5.72

TABLE 18

1988-89 Household Wood Fuel Consumption Family Size

	1 & 2 Person	3 Person	4 Person	5 or More
Cords/Season	4.27	5.14	5.19	5.44

TABLE 19

1988-89 Household Wood Fuel Consumption and Dwelling Type

	One Storey Detached	Multi-Storey Detached
Cords/Season	4.27	5.26

TABLE 20

1988-89 Household Wood Fuel Consumption and Age of Dwelling

	1970-89	1945-69	Pre-1945
Cords/Season	4.49	4.24	5.75

3.3 Characteristics of Wood Fuel Cutters

The wood cutters sources of wood fuel were as follows:

TABLE 21

Wood Cutters Source of Wood Fuel

	1990 (N=93)	1986-87 (N=155)
Wood Cutters Own Woodlot	83.9	80.0
Friends or Neighbour's Woodlot	15.0	18.1
Crown Land	1.1	1.9
Total	100.0	100.0

The following harvesting practices are being carried out by wood fuel cutters.

TABLE 22

Wood Fuel Cutters Harvesting Methods

	1990 (N=93)	1986-87 (N=155)
Clear Cutting	30.1	45.8
Removing Dead Stock	23.7	11.0
Thinning	6.5	16.0
Pick and Choosing	28.0	21.3
Don't Know	11.8	5.8
Total	100.0	100.0

While clear cutting has declined since the last survey, selective cutting (dead stock and other selected trees) appears to have increased a corresponding amount. Wood fuel from thinnings has also declined.

Method of transporting fuel wood from stump to home has not changed significantly from the last survey. Farm tractor and trailer at 69% of respondents along with the truck at 23% continue to be the prime vehicles.

The question relating to participation in government sponsored forestry management yielded questionable results. While those claiming participation rose from 5.8% to 19.4% the respondents claiming they didn't participate remained at

70%. The difference came out of the group that did not know whether they were or not.

While the fall continues to be the most popular time for harvesting wood fuel (inconsistent with burning seasoned fuel unless they hold it for a full year), it is down substantially from the last survey.

TABLE 23

Periods for Harvesting Fuel Wood

	1990 (N=93)	1986-87 (N=154)
January - March	16.1	7.8
April - June	24.7	15.6
July - September	16.1	14.3
October - December	43.1	62.3
Total	100.0	100.0

3.4 Characteristics of Wood Fuel Purchasers

Sixty-two percent of wood fuel purchasers were able to correctly define the size of a cord of wood, compared with 48.5% in the last survey.

The following table shows the form in which wood fuel is purchased.

TABLE 24

Characteristics of Fuel Wood at Time of Purchase

	1990 (N=105)	1986-87 (N=97)
8' Lengths	30.5	27.8
Blocked	57.1	49.5
Blocked and Split	8.6	14.4
Other	3.8	8.3
Total	100.0	100.0

The average price paid for a cord of wood for the 1989-90 heating season was calculated to be $81.00. This is $5.00 or 6.5% higher than paid in 1986-87. Eighty-six percent of the respondents reported that this price included delivery.

Just under two-thirds of the respondents reported that they paid the same in 1988-89 as they did for this heating season, while 32.6% reported paying more.

The following table outlines the time when wood burners purchase wood.

TABLE 25

Season for Purchasing Wood

	1990 Survey (N=105)	1986-87 Survey (N=97)
January - March	2.9	0.0
April - June	26.7	21.6
July - September	37.1	35.1
October - December	33.3	43.3
Total	100.0	100.0

The 1986-87 survey reported that April-September purchase at 56.7% was higher than the 44.1% reported in 1984-85. This survey shows a further increase to 63.8%.

3.5 Questions About Hardwood Availability

The question relating to wood burners' ability to obtain hardwood fuel over the next five years yielded similar responses from wood cutters and buyers with approximately three-quarters feeling confident about supply, 10% not confident and the remainder declaring they did not know.

Perhaps more interesting is the following table describing what people expect to do if the hardwood supply is not there.

TABLE 26

If Insufficient Hardwood Available?
What do Wood Burners Plan to Do

	Cutters (N=93) %		Buyers (N=105) %		Total (N=198) %	
Burn Available Hardwood and Then Softwood	63.4	(69.0)	39.0	(33.0)	50.5	(55.2)
Burn Hardwood and Oil	16.1	(19.4)	47.6	(44.3)	32.8	(29.0)
Switch to Fuel Oil	12.9	(5.8)	8.6	(12.4)	10.6	(8.3)
Don't Know	7.5	(5.8)	4.8	(10.3)	6.1	(7.5)
Total	100.0	(100.0)	100.0	(100.0)	100.0	(100.0)

(1986-87 survey results in brackets.)

In light of the substantial drop in wood cutters it makes it very difficult to interpret the above results. The high percentage of wood cutters who are prepared to use softwood to make up for shortages of hardwood tend to indicate a strong group of wood burners. The average level of wood consumption for wood cutters has remained strong (6.00 cords/house/year vs 6.21 cords during the 1986-87 survey). This again indicates a strong commitment. While the percentage of respondents prepared to switch to oil in the face of declining hardwood supplies has grown, the small percentage (5.8%) measured in the 1986-87 survey did not give us any forewarning of the decline in cutters which was about to take place. It is not known whether the cutters started buying wood or whether they quit burning wood.

3.6 Attitudes Towards Wood Burning

Two key questions were asked of both wood burners and non-wood burners -- (1) What are the major advantages of burning wood? and (2) What are the major disadvantages?

TABLE 27

Major Advantages of Heating with Wood

	Cutters (N=93) %	Buyers (N=105) %	Non-Users (N=233) %	Total (N=431) %
Economic	44.1 (68.4)	19.0 (43.3)	33.9 (40.5)	32.5 (51.7)
Other	55.9 (31.6)	79.0 (56.7)	38.2 (59.5)	52.0 (48.3)
No Answer/Neither	0.0	1.9	27.9	15.5
Total	100.0	100.0	100.0	100.0

(1986-87 survey results in brackets.)

TABLE 28

Major Disadvantages of Heating With Wood

	Cutters (N=93) %	Buyers (N=105) %	Non-Users (N=233) %	Total (N=431) %
Too Much Labour	41.3 (32.4)	33.3 (38.1)	29.7 (29.1)	32.9 (32.7)
Dirty (wood, ashes, etc.)	38.7 (44.5)	43.0 (38.1)	21.5 (37.3)	30.1 (40.2)
Safety	15.0 (20.6)	12.9 (20.6)	28.8 (27.2)	22.2 (23.2)
Problems of Supply	3.8 (1.2)	9.7 (2.1)	17.8 (1.3)	1.8 (1.2)
Capital Cost	1.2 (0.6)	1.1 (1.0)	2.3 (2.5)	13.0 (1.5)
Total	100.0	100.0	100.0	100.0

(1986-87 survey results in brackets.)

The preceding tables (27 and 28) perhaps give the best clues as to what has caused the decline in residential wood fuel consumption. To start with the question about wood fuel advantages resulted in a significant reduction in the "economics" response by wood burners and an unsolicited comment by 28% of the non-burners that there was "no advantage" to wood fuel.

The major disadvantage question prompted an increased response of "too much labour to wood burning" from wood cutters and an increased response from wood buyers about the cost and difficulty in obtaining wood fuel. The non-wood burners also gave wood prices and difficulty of supply a significantly higher response than in 1986-87.

3.7 Wood Fuel and Non-Burning Respondents

Three questions were asked of non-wood burners to determine whether they had burned wood in the past, if they had why they had stopped and whether they planned to burn wood in the future.

TABLE 29

Non-Wood Burning Respondents Use of Wood Fuel in the Past
(N=233)

Burned Wood Within Last	%		Why They Stopped	%
5 years	17.6		Moved to apartment	27.1
10 years	4.3	(27.2)	Too much work	37.5
15 years	3.9		Too dirty	12.5
Never	74.2	(72.8)	Problems of supply	22.9
	100.0	(100.0)		100.0

Future Intensions to Burn Wood Fuel	%	
Yes	10.3	(12.0)
No	75.5	(74.4)
Don't know	14.2	(13.6)
	100.0	(100.0)

(1986-87 survey results in brackets.)

The percentage of non-wood burners who have burned wood in the past is virtually the same as the last survey (25.8% vs 27.2%). It is interesting to note that two-thirds of these have quit during the last five years. The reasons why they quit are also interesting with one-quarter reportimg moving to an apartment (seniors?) and more than a third reporting that too much work was

involved in wood heating. Problems of supply (which includes the price of fuel as well as other supply difficulties) was also mentioned by more than 20% of the non-wood burning respondents.

The response to the question of whether they intend to burn wood in the future was about the same as during the last survey for 1986-87.

4. 1990 SURVEY COMPARED WITH PREVIOUS SURVEYS

4.1 Wood Burning Households

The number of wood burning respondents determined during the last four surveys ranged between 60.4 and 62.0%. The drop to 45.9% in this survey, while it should not be unexpected, was surprising in view of the relative stability of wood buyers and the sharp reduction in the number of wood cutters which dropped from 37.8% of respondents in 1986-87 to 21.5% in the 1990 survey.

Separating home owning respondents from renters also reveal some interesting changes.

TABLE 30

Wood Burning and Home Ownership

	1990 Survey	1986-87 Survey
% Wood Burning Homeowners	51	66
% Wood Burning Renters	15	21

4.2 The Average and Total Consumption of Fuel Wood

As noted in Sections 1.1, 1.2 and 1.3 there are an estimated 43,500 households in P.E.I. at the time of the survey, 74% of which are owner occupied and 26% are rented. While this survey contacted more renters than previous surveys at 15.3%, this is still well short of the estimated 26%. While 45.9% of the respondents reported burning wood; 51.4% of the homeowners and 15.4% of renters did so.

The number of respondents contacted in Queens County was close to what one would have expected from the 1986 Census. However, the number of urban households at 69.2% was greater than Census data of 54.7%. The number of

respondents in Kings County was approximately 50% higher than expected and Prince approximately two-thirds of what one would have been expected based on 1986 Census data. The number of urban respondents in Prince County was also higher at 51.5% than the 1986 Census figure of 32.7%.

Based on an estimated 43,000 households (estimated for the 1988-89 heating season) and correcting only for rentals as has been done in previous surveys it was calculated that there are 16,380 owner occupied and 1,720 rental occupied wood burning households. This adds up to 18,100 wood burning households or 42.1% of the households. This compares with the calculated figure of 55.2% for the 1986-87 survey.

The 95% confidence limits would be 18,100 ± 2,600 households who burn wood, or expressed as a percentage, 36.0 to 48.1% of the households burn wood. The major portion of this uncertainty is associated with the determination of the wood burning habits of renters (small samples yield high uncertainties).

In Table 31 data from the last 3 surveys has been provided for comparison with the current survey.

TABLE 31

Households, Wood Burning Households and Fuelwood Consumption in P.E.I. 1982-83 to 1988-89

	1982-83 Survey	1984-85 Survey	1986-87 Survey	1988-89 Survey
Households	38,200	39,900	41,980	43,000
Owner-Rental	75/25	75/25	75/25	74/26
Wood Burning Households	21,090	21,980	23,180	18,100
Average Consumption (cords/household)	4.89	5.18	5.57	4.90
Total Residential Consumption	103,000	114,000	129,000	89,000*

*Based on 95% confidence limits applied to wood burning households the 1988-89 consumption would lie between 76,300 and 101,700 cords.

From the question on wood types it was calculated that 76% of the cords burned are hardwood. Applying this against the estimated number of cords burned yielded a range of 58,000 to 77,300 cords of hardwood consumed.

As a result of the under representation of Prince County and rural households it is necessary to attempt to adjust the data to reflect these anomalies.

(a) If we adjust the data on the basis of the estimated rural/urban split, rental/ownership pattern and using the wood consumption patterns for urban and rural wood burners the 1988-89 residential wood fuel consumption would be 96,600 cords (see Appendix B).

(b) If we adjust the data to reflect the county breakdown, the urban/rural split within the county, their respective patterns of ownership and rental and apply the county wood consumption patterns the 1988-89 residential wood fuel consumption would be 94,200 cords.

In the above examples rental households were assumed to burn the same amount of wood as the comparable owner occupied dwelling, but at one half the frequency, i.e. urban wood burners (rental and owner) average 3.61 cords per year. 28.7% of urban respondents burned wood therefore it was assumed the 14.4% of urban rental respondents burned wood. This assumption was necessary because the survey sample contained only 10 respondents who burned wood and rented their dwelling.

The above assumptions are felt to be somewhat optimistic because urban renters are unlikely to burn wood.

5. DISCUSSION OF RESULTS

This survey, and the five preceding it, have provided a wealth of information about wood burners and non-wood burners. In previous surveys the most significant element had been the growth in residential wood fuel consumption which reached an estimated 129,000 cords during the 1986-87 heating system. This level was the product of a high level of participation and growing consumption levels. It also resulted in a level of hardwood consumption which approached the estimated forest sustainable yield.

The major feature of this survey is the sharp drop in residential wood fuel consumption resulting from a reduction in the number of wood cutters and reduced levels of consumption by wood buyers.

This reduction in consumption raises two important questions which we will try to address:

- What other supporting evidence is there for this substantial drop in consumption? and

- What indicators were perhaps present in the 1986-87 survey which might have lead us to anticipate such a change and were there any attitudinal changes evident between the two surveys?

As previously noted the number of wood buyers increased slightly from 23.7% to 24.4% of the respondents while their consumption dropped from 4.56 to 3.92 cords per household or a decrease of 14%. At the same time wood cutters dropped from 37.8% to 21.6% of the respondents while average consumption dropped just over 3% from 6.21 cords to 6.00 cords per household. After making adjustments for the under representation of rental units it was estimated that residential fuel wood declined some 37,000 - 40,000 cords or 29 - 31%.

If we can assume that light fuel oil required for non-residential uses has remained relatively constant between the 1986-87 and the 1988-89 survey years, the changes in fuel oil sales should roughly reflect the changes in wood fuel use. For purposes of this analysis we will ignore the effect of district heating which has also displaced light fuel oil in both the residential and non-residential sectors. This analysis is presented in the following table.

TABLE 32

Wood Fuel (Residential) and Light Fuel Oil

	1986-87		1988-89	
Number of Households		41,980		43,000
Residential Heating Energy Light Oil Equivalent (000 m^3)		125.9		129.0
Less Oil Equivalent of Wood Fuel Consumed	58.6*		40.5**	
Other Non-Oil Fuels	2.5		2.6	
		61.1		43.1
Oil for Residential Sector		64.8		85.9
Sales of Light Fuel Oil and Stove Oil		146.8		170.6
Oil for Non-Residential Heating Use		82.0		84.7

*Equivalent to 129,000 cords. **Equivalent to 89,000 cords.

In carrying out this analysis the following assumptions were made:

1. each household consumes heating energy equivalent to 3 m^3 of light fuel oil;
2. a cord of wood fuel replaces 0.455 m^3 of light fuel oil;
3. approximately 2% of the housing stock use other fuels, i.e. electricity, propane, etc.; and
4. sales of light fuel oil and stove oil from Statistics Canada (Cat. 45-004) Refined Petroleum Products are averaged, e.g. 1986 and 1987, 1988 and 1989.

The second issue about being able to forecast the decline in residential wood fuel use was considered in the 1986-87 survey as a result of the approximately 8¢/litre reduction in fuel oil prices. The 1986-87 survey tried to find out if people recognized the change in price and if so what effect did they expect this change to have on their wood burning.

The results of the 1986-87 Survey of Wood Fuel Use in P.E.I. (see Appendix A) indicated that few wood burners knew about the oil price reduction and as a result anticipated little change in their use of wood fuel. One can only assume that because of their wood burning activities they were either out of touch with what had happened to oil prices or they felt that this change was only temporary and should be ignored. If this question had been asked in the spring of 1988 or 1989 we might have received a substantially different answer.

While there did not appear to be any indicator in the 1986-87 survey a comparison of the results from the attitude question in the two surveys seem to support the changes which have taken place (see Tables 27 and 28).

In 1986-87 economics appeared to play a major role in why people burned wood, i.e. 51.7% of all respondents felt there was an economic advantage to burning wood. In fact wood buyers and non-wood users had similar opinions about wood burning (approximately 40% felt economics were important while 68% of wood cutters felt economics was the major advantage). The 1990 survey results showed major changes in these attitudes. The economic rationale declined substantially in all categories to be replaced by other reasons (i.e. quality of heat, etc.). In the non-burners category a substantial number responded with the unsolicited response that there was no advantage.

In the question related to disadvantages the differences are more subtle with cutters responding more frequently that "too much labour" is involved in

wood heating while buyers have responded more frequently that they are concerned about the "mess" generated in wood burning.

This change in attitude towards wood burning does not appear to be inconsistent with decreased wood fuel use.

While one survey does not make a trend, it would appear that the relative prices of wood and fuel oil will have a major effect on the volume of wood fuel consumed. Should oil prices remain relatively stable further shrinkage in wood fuel consumption could be expected while rapidly increasing fuel oil prices or a major economic downturn could cause the wood fuel market to rebound to the higher levels experienced in the mid-80's.

APPENDIX A

Taken from the Survey of Wood Fuel Use in Prince Edward Island 1986-1987 Report

TABLE 19

What Happened to Fuel Oil Prices in 1986?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Oil Prices:				
Stayed about the same	15.5	12.4	36	14.3
Went up slightly	19.4	25.8	55	21.8
Went down slightly	32.9	33.0	83	32.9
Dropped quite a bit	4.5	3.1	10	4.0
Don't know	27.7	25.8	68	27.0
Total	100.0	100.0	252	100.0

TABLE 20

Did the Price of Fuel Oil Have an Affect on Wood Fuel Use this Season?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Used more wood	23.2	20.6	56	22.2
Stayed about the same	55.5	64.9	149	59.1
Used less wood	1.9	3.1	6	2.4
Switched to oil	0.0	0.0	0	0.0
Don't know	19.4	11.3	41	16.1
Total	100.0	100.0	252	100.0

TABLE 21

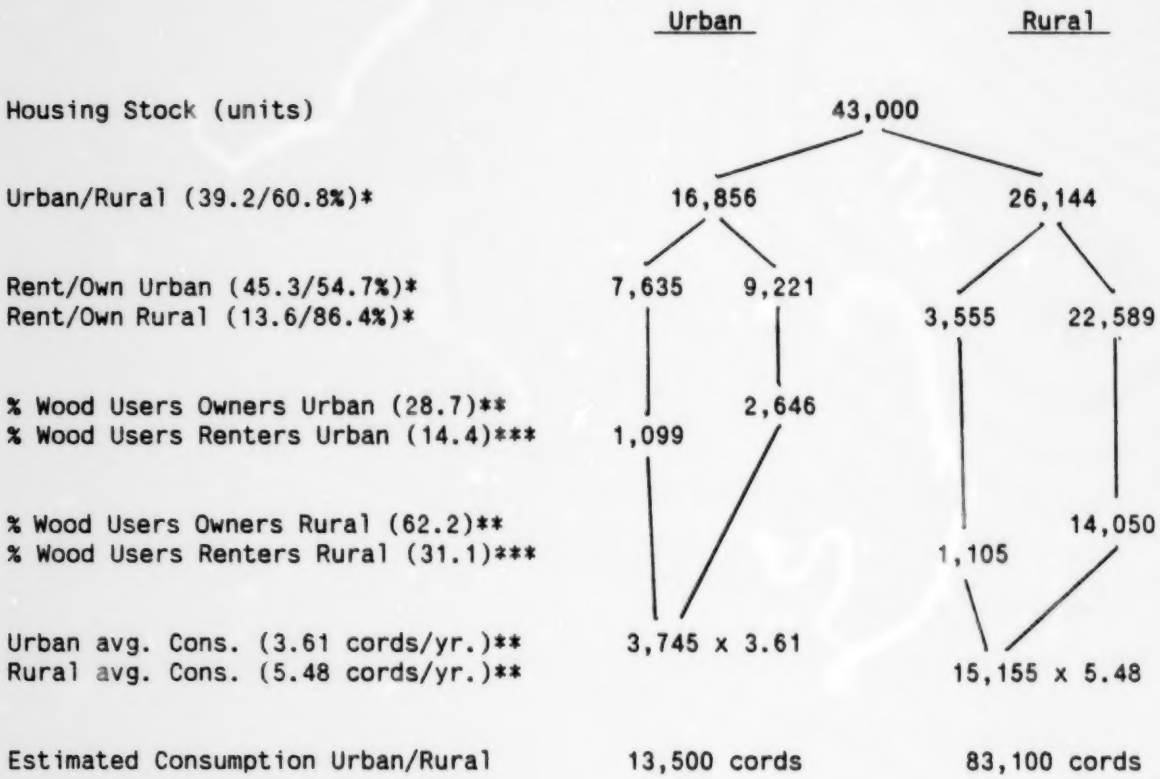
Do You Expect the Price of Fuel Oil to Affect Wood Fuel the Next Season?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Will use more wood	19.4	17.5	47	18.7
Stay about the same	54.2	62.9	145	57.5
Used less wood	3.9	3.1	9	3.6
Switch to oil	0.0	0.0	0	0.0
Don't know	22.6	16.5	51	20.2
Total	100.0	100.0	252	100.0

APPENDIX B

ALTERNATIVE CALCULATION OF WOOD FUEL CONSUMPTION FOR 1988-89 CORRECTING FOR URBAN BIAS



Total Consumption (1988-89) = 96,600 cords

If Rental % Wood Burners Calculated at One-Quarter Owners...

Total Consumption (1988-89) = 91,600 cords

*From 1986 Census.

**From 1990 Wood Fuel Survey.

***Renters frequency burning wood was estimated at one-half the owner frequency rate. The number of wood burning renters was only 10 in the 431 respondents and none of these were urban.

APPENDIX C

1988-1989 P.E.I. WOOD FUEL SURVEY

The interviewer should ask to speak to either the male or female head of the household. The interviewer should then explain that they would like to ask some questions about the heating of their home and that the questions should take only a few minutes. These questions are being asked by Resource Ventures Inc. on behalf of the P.E.I. Department of Energy and Forestry.

1. Is the respondent?

   (1) male (2) female

2. In what county of Prince Edward Island do you live?

   (1) Prince (2) Queens (3) Kings

3. Do you live in? (1) Wilmot, Summerside, St. Eleanors

   (2) Charlottetown, Sherwood, Parkdale, East or West Royalty, Southport, Bunbury, Cornwall

   (3) None of the above.

4. Which of the following best describe your home?

   (1) 1 story detached (4) apartment

   (2) 2 or more story detached (5) duplex

   (3) row house (6) other _____

5. About when was your home built?

   (1) 1980 to 1989 (4) 1945 to 1959

   (2) 1970 to 1979 (5) 1900 to 1944

   (3) 1960 to 1969 (6) in the 1800's

6. What fuels are used to heat your home?

   (1) wood only (6) district heat

   (2) wood and electricity (7) electricity only

   (3) wood and oil (8) oil only

   (4) wood and propane (9) propane only

   (5) wood and other _____ (10) other (landlord) _____

7. Which fuel do you use the most?

   (1) electricity (2) oil (3) propane (4) wood (5) other

IF USING WOOD GO TO QUESTION 8. IF NOT GO TO QUESTION 36 (last page)

WOOD USING RESPONDENTS

8. What is the main wood burning unit used in heating your home?
   (1) Kemac (5) kitchen wood stove
   (2) airtight wood stove (6) Franklin/non-airtight
   (3) wood furnace (7) combination wood/oil furnace
   (4) fireplace insert (8) fireplace (open)
9. What other type of heating system do you have in your home?
   (1) wood unit only (6) Kemac
   (2) combination wood/oil furnace (7) electric heat
   (3) hot water oil furnace (8) kerosene heater
   (4) hot air oil furnace (9) coal furnace
   (5) oil space heater (10) other _____
10. Is wood heating your domestic hot water?
   (1) yes (2) no
11. How long have you been using wood to heat your home?
   (1) 0 - 2 years (2) 2 - 4 years (3) 4 - 6 years (4) over 6 years
12. Are you burning green or seasoned wood?
   (1) green (2) seasoned (3) mixture of both (4) don't know
13. Where are you getting your wood?
   (1) cut from woodlot (2) purchase

IF CUT FROM WOODLOT CONTINUE TO QUESTION 14, IF NOT GO TO QUESTION 23.

IF WOODLOT CUTTERS

14. What type of cutting are you doing from the woodlot?
   (1) clear cutting (2) salvaging dead trees (3) thinning poor stock
   (4) pick and choose (5) don't know
15. What kind of wood are you cutting for your fuel?
   (1) only softwood (2) only hardwood (3) mixture: H(75%), S(25%)
   (4) H(50%), S(50%) (5) H(25%), S(75%)
16. How do you get wood from stump to roadside or house?
   (1) tractor/trailer (2) tractor/winch (3) horse
   (4) snowmobile/ATV (5) skidder (porter-forwarder) (6) manual/truck
   (7) portable winch (8) don't know
17. At what time of the year do you usually cut your supply of wood?
   (1) January - March (2) April - June (3) July - September
   (4) October - December

18. Can you get enough softwood to cut for the next 5 years?
    (1) yes (2) no (3) don't know
19. Can you get enough hardwood to cut for the next 5 years?
    (1) yes (2) no (3) don't know
20. If you can't harvest enough hardwood what would you do?
    (1) burn the available hardwood and burn more softwood
    (2) burn the available hardwood and some fuel oil
    (3) switch to fuel oil only
    (4) don't know
21. Where are you cutting your wood fuel?
    (1) personal woodlot (2) friend's woodlot (3) Crown land

IF 21 (1) CONTINUE TO QUESTION 22, OTHERWISE GO TO QUESTION 32.

22. Is your woodlot involved in the government sponsored Forestry Management Program?
    (1) yes (2) no (3) don't know

GO TO QUESTION 32.

<u>IF PURCHASING WOOD</u>

23. How are you buying your wood?
    (1) 8 ft. lengths (2) 4 ft. lengths (3) blocked
    (4) blocked and split (5) tree length (6) 8 ft. length slabs
    (7) blocked slabs (8) wood chips/sawdust
24. What kind of wood are you buying?
    (1) only softwood (2) only hardwood (3) mixture: H(75%), S(25%)
    (4) H(50%), S(50%) (5) H(25%), S(75%)
25. How much do you pay for a cord of fuel wood this heating season(1989-90)?
    (1) $30 - $40 (2) $40 - $50 (3) $50 - $60 (4) $60 - $70
    (5) $70 - $80 (6) $80 - $90 (7) $90 - $100 (8) $100 - $110
    (9) $110 - $120 (10) don't know
26. Does the price you paid for wood include delivery of the wood?
    (1) yes (2) no (3) don't know
27. Was this? (1) more than you paid last season(1988-89)
    (2) less than you paid last season(1988-89)
    (3) about the same(1988-89)

28. At what time of year do you usually purchase your supply of wood?

(1) January - March (2) April - June (3) July - September

(4) October - December

29. Are you confident you will be able to buy an adequate supply of softwood over the next 5 years?

(1) yes (2) no (3) don't know

30. Are you confident you will be able to buy an adequate supply of hardwood over the next 5 years?

(1) yes (2) no (3) don't know

31. If you can't buy enough hardwood what would you do?

(1) burn the available hardwood and burn more softwood

(2) burn the available hardwood and some fuel oil

(3) switch to another fuel or heating system

(4) don't know

CONTINUE TO QUESTION 32.

32. How many cords of wood did you burn during the 1988-89 heating season (last season, not this heating season)?

(1) 0 - 1 (2) 1 - 2 (3) 2 - 3 (4) 3 - 4 (5) 4 - 5 (6) 5 - 6

(7) 6 - 7 (8) 7 - 8 (9) 8 or more

33. What effect did the price of fuel oil during 1989 have any effect on your plans for wood fuel use during this heating season?

(1) to use more wood (2) stay about the same (3) use less wood

(4) switch to oil (5) don't know

34. Many people burn another fuel besides wood such as oil, do you intend to

(1) burn more wood and less of the other fuel

(2) burn less wood and more of the other fuel

(3) burn about the same of each

35. What are the dimensions of a full cord of wood?

(1) know (2) don't know

GO TO QUESTION 40.

<u>NON-WOOD USING RESPONDENTS</u>

36. What type of heating system do you have in your home?

(1) hot air oil furnace (2) hot water oil furnace (3) electric heat

(4) oil space heater (5) propane heater (6) coal stove

(7) coal furnace (8) heat supplied by landlord

37. Have you used wood to heat your home during the past...

(1) 5 years (2) 10 years (3) 15 years (4) never

38. If you used wood during the past, why did you stop?

(1) moved into an apartment and somebody else now supplies heat

(2) no longer have access to cheap wood (own woodlot)

(3) wood is too much work

(4) wood is too messy

(5) wood is too expensive

39. Are you considering heating with wood in the future?

(1) yes (2) no (3) don't know

CONTINUE TO QUESTION 40.

GENERAL INFORMATION (ALL RESPONDENTS)

40. What do you consider to be the major advantage of heating with wood?

(1) economic - savings, low cost fuel, oil too expensive, etc.

(2) other - quality of heat, like being involved, everything else

41. What do you consider to be the major disadvantage of heating with wood?

(1) problems of obtaining fuel (2) too much labour required

(3) dirty wood, ashes, etc. (4) safety

(5) capital cost of equipment (6) wood is too expensive

42. Do you?

(1) own your own home (2) rent

43. How many people are there in your household?

(1) one (2) two (3) three (4) four (5) five (6) more than five

The following two questions are of a more personal nature which you may choose not to answer if you do not wish to.

44. Education level attained.

(1) elementary 1-7

(2) secondary 8-12

(3) post secondary Holland College/University

(4) chose not to answer

45. What is your approximate family income?

(1) less than $15,000 (2) $15,000 - $35,000

(3) $35,000 - $50,000 (4) more than $50,000

(5) chose not to answer

Thank you for participating in this survey.